(Marked Up Version)

~~**Mirror glass assembly having integrated luminescent film**~~

~~DESCRIPTION:~~ **MIRROR GLASS ASSEMBLY HAVING INTEGRATED LUMINESCENT FILM**

Background Art

1. Field of the Invention

[0001] The ~~present~~ invention relates to a vehicle external mirror module having a mirror glass ~~assembly, the latter having at least one~~. More particularly, the invention relates to a vehicle external mirror module having a mirror glass and ~~at least one~~a luminescent element attached thereto.

2. Description of the Related Art

[0002] An external mirror of this type is known from DE 103 27 072. A heating film is situated behind the mirror glass, which projects beyond the meandering heating element laid thereon. LEDs, whose light exits in front of the front side of the mirror glass, are attached to the projecting part of the film, which is additionally guided around the edge of the mirror glass. Such projections of the film require additional space, limitations on contour design, and increase material costs.

[0003] ~~The present invention is thus based on the object of developing a vehicle external mirror module, in which at least one luminescent element is integrated in a space-saving way and is attached in such way that it may be mounted easily and securely with little wiring outlay.~~

[0004] ~~This object is achieved by the features of the main claim. For this purpose, at least one of the luminescent elements is a luminescent film. The luminescent film(s) is/are situated~~

~~behind the mirror glass. The mirroring of the mirror glass is partially transparent or semitransparent in at least some areas in the area of the luminescent films.~~

[0005] ~~The luminescent elements incorporated in the external mirror module are typically electroluminescent films. The luminescent elements, for example, have their wiring integrated in the heating film in addition to the heating element. The heating film equipped in this way is then united with the mirror glass and a mirror glass support to form a mirror glass assembly through gluing, for example.~~

[0006] ~~The luminescent element is mounted together with the mirror heater in a simple way by inserting and gluing the heating film, which is usually thin. Since the heater and the luminescent element have a shared terminal strip or a shared plug, for example, the connection of the external mirror module to the vehicle is additionally simplified.~~

[0007] ~~In addition to the luminescent films, other luminescent elements, such as LEDs, are possibly also situated on the heating film. These diodes are seated on the edge of the mirror glass in front of the mirroring, for example.~~

Summary of the Invention

[0008] A vehicular external mirror module includes a mirror housing. A mirror glass is housed within the mirror housing. The mirror glass includes a non-mirrored surface facing out of the mirror housing and a mirrored surface facing the mirror housing. The vehicular external mirror module also includes a luminescent film fixedly secured to the mirror surface of the mirror glass. The luminescent film emits light out from the luminescent film through the mirror glass.

Brief Description of the Drawings

[0009] ~~Further details~~Advantages of the ~~present invention result from the subclaims and~~invention will be readily appreciated as the same becomes better understood by reference to the following detailed description ~~of multiple exemplary embodiments, which are schematically illustrated.~~ when considered in connection with the accompanying drawings, wherein:

[0010] Figure 1~~: shows a vehicle external mirror module viewed from the mirror side~~ is a side view, mirror side, of one embodiment of the invention;

~~Figure 2: shows a partial section through the vehicle external mirror module having luminescent film and transmitted light orientation film;~~

[0011] Figure 2 is a cross-sectional top view, partially cut away, of the invention;

[0012] Figure 3~~: shows~~ is a side view of a heating film ~~having an integrated luminescent film;~~ incorporated into one embodiment of the invention;

[0013] ~~Figure 4: shows a partial section having a transmitted light orientation film;~~

[0014] Figure 4 is a cross-sectional side view, partially cut away, of the invention; and

[0015] Figure 5~~: shows an arrangement plan for~~ is a side view, mirror side, of an alternative embodiment of the invention having multiple luminescent films.

Detailed Description of the Preferred Embodiments

[0016] Figure 1 shows a vehicle external mirror module ~~which, inter alia, comprises~~. The vehicular external mirror module includes a mirror housing ~~(1),~~1, a mirror glass ~~(11),~~11, and a mirror base cover ~~(3)~~ of a mirror base (not shown).

[0017] A partial section oriented transversely to the mirror glass ~~(~~11~~)~~ is shown in Figure 2. A mirror glass module ~~(~~10~~)~~ is enclosed here laterally and on the back by the mirror housing ~~(~~1~~)~~ and ~~the~~an enclosure ~~(2),~~2, which is engaged or glued therewith. The mirror glass module ~~(~~10~~)~~ is typically mounted so it is adjustable in the mirror housing ~~(1).~~1. For this purpose, this mirror glass module ~~(~~10~~)~~ is seated with play inside the enclosure ~~(2).~~2.

[0018] As shown in Figure 2, the mirror glass module 10 includes a mirror glass support 50, an adhesive film 40, a heating film 20 having a integrated luminescent film 61, and a mirror glass frame 51. The mirror glass 11 is attached to the mirror glass support 50 using an adhesive

film 40 and a heating or combination film 20, which is also adhesive. By way of example, the adhesive film 40 is a microcellular rubber or another thin-walled elastomer body equipped on both sides with an adhesive layer. During the mounting, the adhesive layer 40 of the combination film 20 is glued onto a back side 13 of the mirror glass 11. The adhesive film 40 is applied in turn to the combination film 20, in order to bond the mirror glass 11 to the mirror glass support 50.

[0019] ~~As shown in Figure 2, the mirror glass module (10) comprises a mirror glass support (50), an adhesive film (40), a heating film (20) having integrated luminescent film (61-63), and a mirror glass frame (51). The mirror glass (11) is attached to the mirror glass support (50) using an adhesive film (40) and a heating or combination film (20), which is also adhesive. The adhesive film (40) is, for example, a microcellular rubber or another thin-walled elastomer body equipped on both sides with an adhesive layer. During the mounting, the adhesive layer of the combination film (20) is glued onto the back (13) of the mirror glass (11). The adhesive film (40) is applied in turn to the combination film (20), in order to thus bond the mirror glass (11) to the mirror glass support (50). The mirror glass frame (51)~~The mirror glass frame 51 encloses the mirror glass support ~~(~~50~~)~~ to mechanically secure the mirror glass ~~(~~11~~)~~ on the mirror glass support ~~(50), inter alia.~~50. For this purpose, the mirror glass frame ~~(~~51~~)~~ has an outer edge section ~~(54),~~54, which presses against the outer contour of the mirror glass support ~~(~~50~~)~~ and projects beyond the mirror glass exterior ~~(~~12~~)~~ toward the front. The outer edge section ~~(~~54~~)~~ encloses an angle less than or equal to 90° with the mirror glass exterior ~~(12).~~12. A few millimeters in front of the mirror glass exterior ~~(12),~~12, the mirror glass frame ~~(~~51~~)~~ passes into a section ~~(~~53~~)~~ which is oriented parallel to the mirror glass exterior ~~(12).~~12. This section ~~(~~53~~)~~ passes into an inner edge section ~~(~~52~~)~~ which comes to rest on the mirror glass exterior ~~(~~12~~)~~ at approximately 90°. The mirror glass frame ~~(~~51~~)~~ and the mirror glass support ~~(~~50~~)~~ ~~are~~ may be permanently welded or glued to one another~~, for example~~.

[0020] Figure 3 shows a combination film ~~(~~20~~)~~ having a heating web ~~(30),~~30, an integrated luminescent film ~~(61),~~61, a transmitted light orientation film ~~(70),~~70, two printed conductors ~~(~~31, ~~32),~~32, and a connection plug ~~(35).~~35. The combination film ~~(~~20~~)~~ has a wall

thickness of approximately 0.3 to 0.5 mm. The film thickness is predefined for this purpose by the luminescent film component. Since the heating web 30 and the luminescent film 61 have a shared terminal strip 38 (or a shared plug), the connection of the external mirror module to the vehicle is additionally simplified.

[0021] The luminescent film (61) is an electroluminescent film in a flexible or rigid embodiment, which is equipped at least toward the mirror glass (11) with a self-adhesive layer as a part of the heating film ~~(20), for example.~~20. In the area in which the luminescent film (61) is positioned, the mirroring is semitransparent, i.e., it allows the cold light generated behind the back (13) of the mirror glass (11) in the luminescent film (61) to shine through nearly unobstructed, while the transparency resulting due to the semitransparency is not perceived by the driver looking into the rearview mirror. This applies at least for the operating state in which the luminescent film (61) is not powered. The area of the semitransparent window (18) of the mirroring is smaller than the light-emitting area of the luminescent film ~~(61).~~61. The edge of the light-emitting area is behind the completely mirrored area of the mirror. While this area is shown as a rectangular area, it should be appreciated by those skilled in the art the area may have other shapes or may form symbols and/or characters.

[0022] The ~~light~~ color of the light of the particular luminescent film (61~~-63~~) may be tailored to the intended purpose.

[0023] A transmitted light orientation film (70) is situated between the luminescent film (61) and the mirror glass (11) in the exemplary embodiment shown in Figures 2 and 3. This film, whose area is also larger than the light-emitting area of the luminescent film ~~(61),~~61, is a transparent plastic film whose thickness is less than 1 mm, cf. Figure 4. Microlamellae ~~(71),~~71, which are oriented parallel to one another, are situated in the film. The microlamellae (71) have a wall thickness which is in the range of a hundredth of a millimeter~~, for example~~. Their distance to one another is 10 times ~~higher, for example~~their thickness. The microlamellae (71) enclose an angle of 60° with the face of the mirror back ~~(13), for example.~~13. Accordingly, the primary light exit direction corresponds to the direction of the arrows ~~(72).~~72. Depending on the intended use,

the angle may be in a range from 30° to 90°. This angle of individual lamellae areas to one another may vary within a transmitted light directional opening. The opening angle (73) between two neighboring microlamellae (71) is typically 30° to 40°.

[0024] Figure 5 shows the front of a combination film (20) having multiple integrated luminescent film areas (61-63),63, without heating web, printed conductors, and connection plug. The luminescent film (61) is used here as a signal light for indicating a change of travel direction. A transmitted light orientation film is placed in front of it, whose microlamellae are oriented from top to bottom. The microlamellae enclose an angle of 20 to 80° with the mirror glass surface (12) - measured in a plane parallel to the roadway surface. A light direction (65) which is primarily oriented to the rear and also to the side facing away from the vehicle, for example, results through this orientation, cf. Figure 5.. As a result, the signal light is well visible to traffic located to the rear and traveling past. The driver cannot perceive the signaling because of the microlamellae orientation.

[0025] In addition to the rectangular luminescent film (61),61, for example, a luminescent film (62) provided as an indicator light is also located on the bottom. Its light direction (66) is oriented toward the driver. For this purpose, the transmitted light orientation film in front of it has a small lamellar angle of approximately 30° to 40° in relation to the mirror glass surface. The traffic to the rear does not perceive the light of the indicator lights. By using the microlamellae, the indicator light may still be perceived well even in bright sunlight. Via the indicator light, which, for example, comprises may include multiple differently shaped and separately activatable luminescent film areas - in the form of symbols or writing - information of the electronic lane change system and/or the blind spot monitor may be communicated to the driver.

[0026] A luminescent film (63),63, which fulfills the function of a background light, is situated in the upper mirror area. It makes getting in and out of the vehicle easier in the dark, for example, in that it illuminates the roadway surface next to the driver and/or passenger doors. The

light direction (67) is directed downward for this purpose. As a result, the traffic to the rear is not disturbed.

[0027] In the exemplary embodiment, the heating web (30),30, shown in Figure 3, has two meandering sections in the middle area of the mirror. It (30) ends on the mirror back in the left, lower area in the connection plug (35).35. Instead of a connection plug (35),35, the printed conductors (31, 32) and the heating web (30) may also end in individual contact tabs, to which power is then supplied in the vehicle external mirror module via springy contact bridges if necessary.

[0028] The printed conductors (31, 32) run largely parallel to the edge (23) of the combination film (20).20. They are applied here on the side of the combination film (20) on which the heating web (30) is situated. Of course, there is also the possibility of attaching the individual printed conductors and heating web in different, electrically insulated levels of a multilayered combination or heating film (20).20.

[0029] In addition, ballasts for the light elements or parts of the electronic controller of the mirror adjusting drives may be situated on the combination film (20),20, e.g., in edge areas. If necessary, the combination film may be reinforced in some areas to receive discrete electronic components, such as ICs.

[0030] Notwithstanding the exemplary embodiments, the luminescent film (61) may also be attached separately to the mirror back (13) together with the printed conductors (31, 32) – which are possibly also applied to a film. This is the case when the external mirror is not heated, for example.

[0031] List of reference numbers:

[0032]

1	mirror housing, vehicle external mirror housing
2	enclosure
3	mirror base cover
5	cutout
10	mirror glass assembly
11	mirror glass
12	mirror glass exterior, non-mirrored
13	mirror glass exterior, mirrored
14	mirror edge
15	mirror edge area facing toward the driver
16	mirror edge area facing away from the driver
18	mirror area, semitransparent; window
20	heating film, combination film
23	heating film edge
30	heating web, heating element
31, 32	printed conductors
35	connection plug, power terminal
38	power terminal
40	adhesive film
50	mirror glass support
51	mirror glass frame
52	inner edge section
53	section parallel to the mirror glass exterior

~~54 outer edge section~~

~~61 luminescent element, luminescent film~~
~~62 luminescent element, luminescent film~~
~~63 luminescent element, luminescent film~~

~~65 light direction~~
~~66 light direction~~
~~67 light direction~~

~~70 transmitted light orientation film~~
~~71 microlamellae~~
~~72 light direction, arrows~~
~~73 light angle~~

[0033] The invention has been described in an illustrative manner. It is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation.

[0034] Many modifications and variations of the invention are possible in light of the above teachings. Therefore, within the scope of the appended claims, the invention may be practiced other than as specifically described.